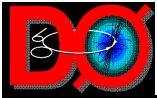# L3 Muon filter and Memory Leaks

Martijn Mulders
on behalf of the L3 Muon team

Muon Software and Commissioning meeting
April 23, 2002
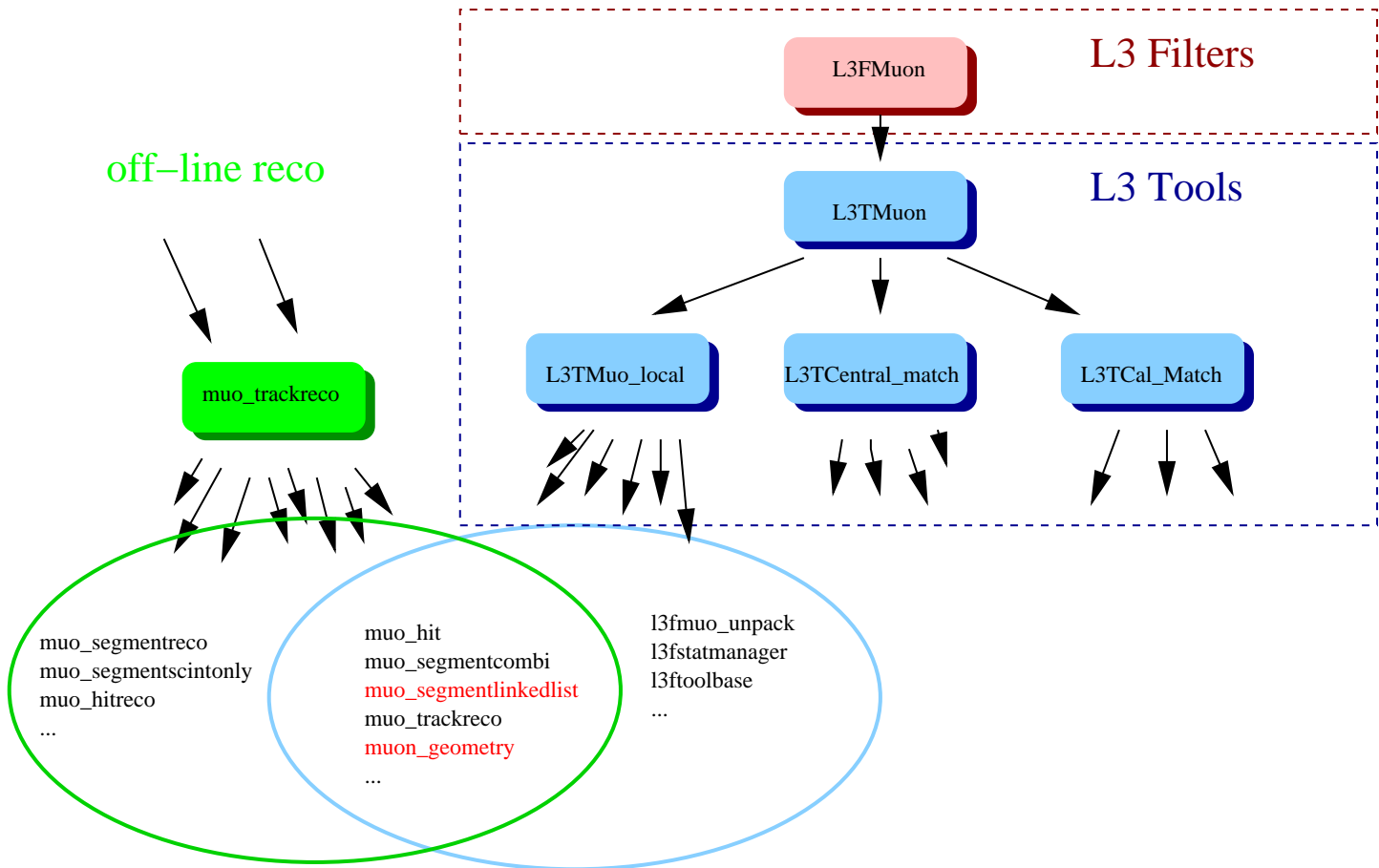
- L3 online running conditions

- Memory leak history & status

- Muon software release procedures

- Conclusion

Level 3 online running

- **Data rates in 3 trigger levels**:
  current: (L1) 100 Hz → (L2) → (L3) 50 Hz
  (single muons prescaled with factor 10-40)
  design: (L1) 2000 Hz → (L2) 1000 Hz → (L3) 100 Hz

- **L3 Muon** can run sophisticated algorithms,
  (almost) like off-line muon reconstruction
  → (partly) use same code:

  − a lot of knowledge, expertise, testing for 'free'
  − but: dependence, less freedom

Structure of code:

L3FMuon

L3 Filters

off–line reco

L3TMuon

L3 Tools

muo_trackreco

L3TMuo_local   L3TCentral_match   L3TCal_Match

muo_segmentreco
muo_segmentscintonly
muo_hitreco
...

muo_hit
muo_segmentcombi
muo_segmentlinkedlist
muo_trackreco
muon_geometry
...

l3fmuo_unpack
l3fstatmanager
l3ftoolbase
...

(overview not at all complete)
... would be nice to know exactly on which packages and classes L3 muon depends
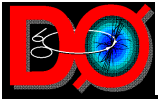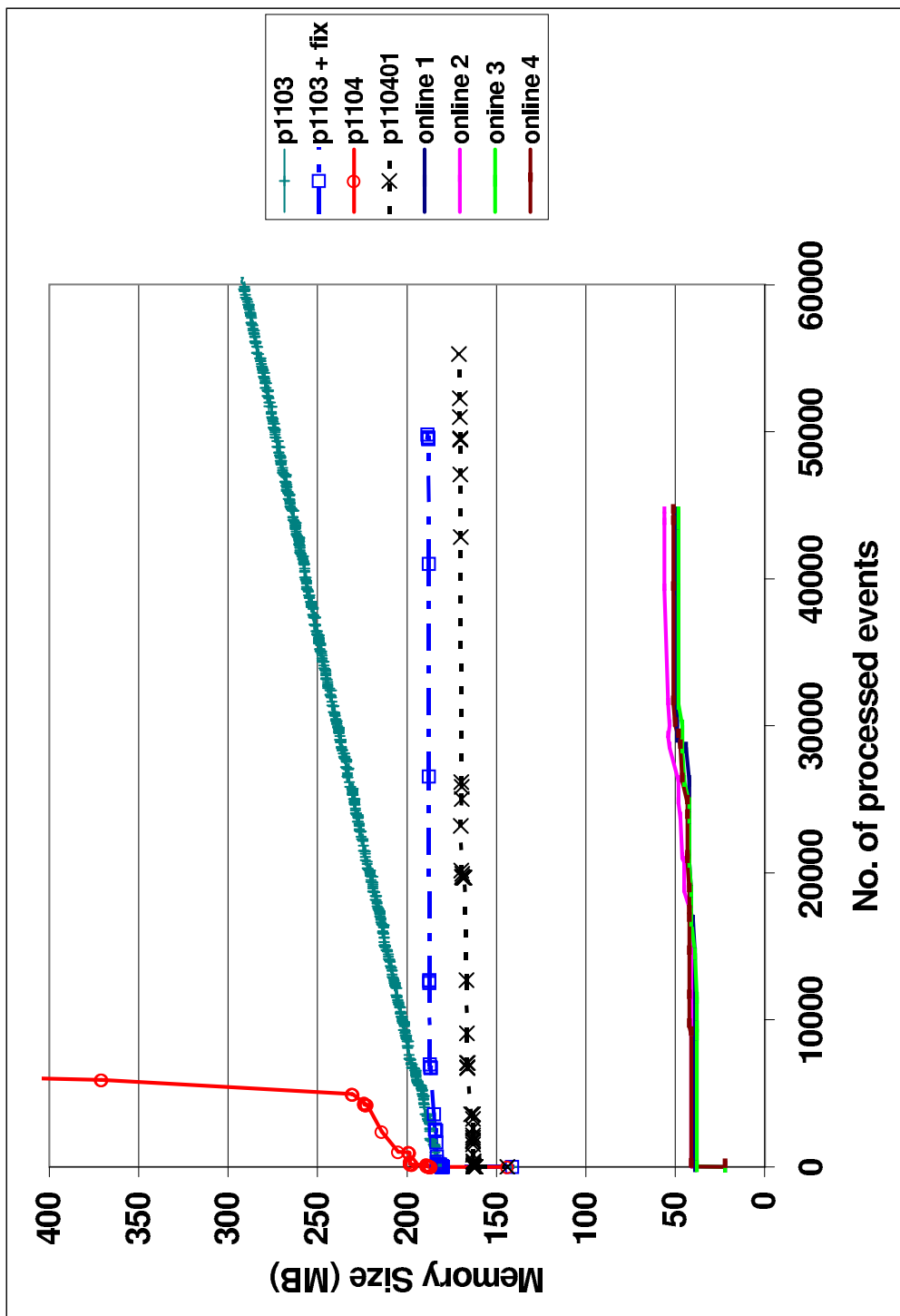
- **Different boundary conditions:** L3 filters run on L3 nodes as integral part of D0 DAQ system! Strict requirements for:

  - integrity / stability
  - memory consumption (1 GB per node)
  - timing (< 100 ms per event)
  - efficiency & rejection

  TO BE MAINTAINED accross releases, as soon as L3 Muon will be running online!
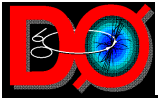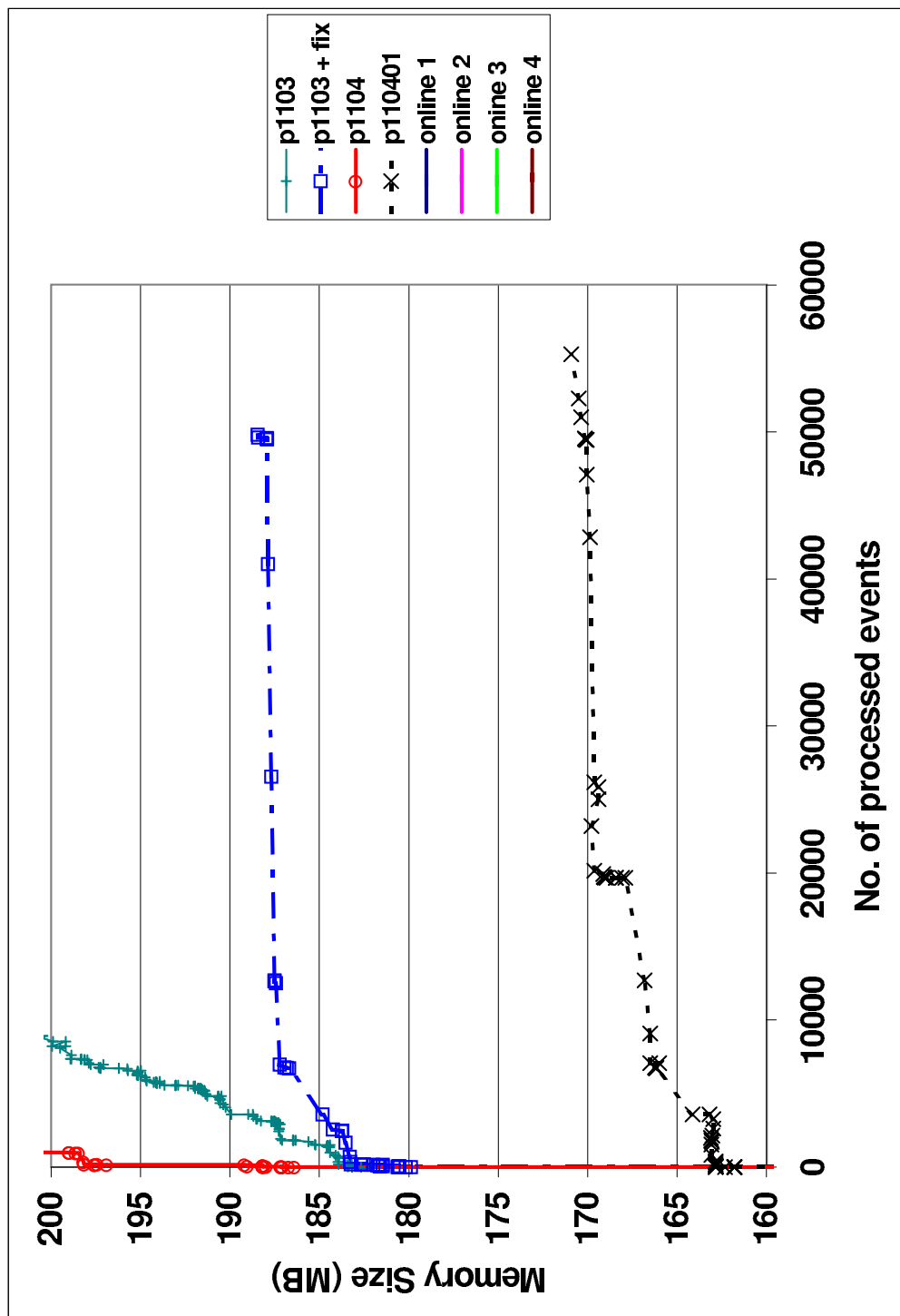
- Memory Leaks: no good tools available

  – Use memory warnings from mem_util package

  – Comment out code function by function, line by line → hard work

- Old leak, 2 kB/event (Paul Balm: June '01) traced down to muon_geometry. Fixed in p11.04.00 thanks to Raimund, Onne, Boris, Jim Kowalkowski, Rick Jesik and others.

- Giant leak (p11.04.00) Traced down by Christophe C., Raimund, myself to muo_segmentlinkedlist and/or muon_geometry. NOT FIXED. Temporary patch as of p11.04.01 by reducing max_mdt_hits back to 30.

- 'Online' leak (p11.04.01) Jump from 50 to 100 MB during online test run??? Not confirmed with cosmics last Friday, with modified RCP parameters for improved timing.
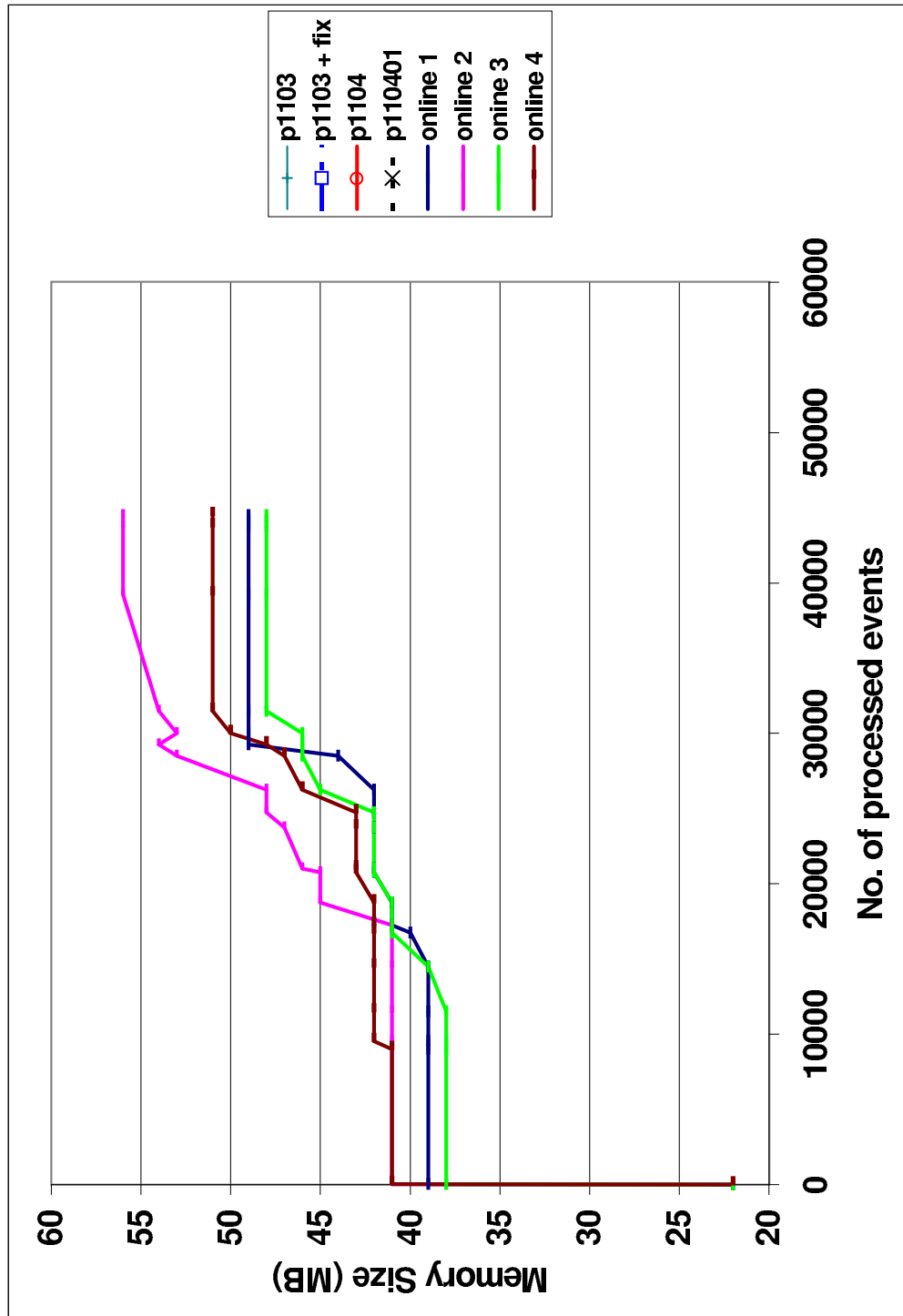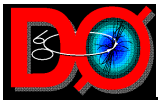
Memory consumption:

'Good' memory consumption:

Legend:
- p1103
- p1103 + fix
- p1104
- p110401
- online 1
- online 2
- onine 3
- online 4

Memory Size (MB) vs No. of processed events

Online memory consumption:

Proposal for Managing Muon Code in Future Releases:
(Linda Stutte, Christophe Royon, Daria Zieminska, Martijn Mulders, Terry Wyatt, Harry Melanson)

1. All developers should test their changes to code in the txx.xx.xx releases by running a standard set of macros on test samples which will be defined. These will include J/Psi forward, J/Psi central, a single muon Monte Carlo file and a general raw data run. Reference plots will be available for these samples. These results will be presented at muon algorithm or muonid meetings. At this point, the code release managers will test all proposed changes together. If all is OK, the changes will be approved for the next t build.

2. For production releases, more care is needed since these releases run both online for L3 and on the farms. Here developers must submit a proposal for changes wanted to the code release managers before modifying the production branch. If approved, the same testing steps outlined above the t releases must be made. In addition, the L3 Muon contact person must perform his memory and timing checks. If all is OK, the code release managers will approve these changes for the next production build by sending a note to Harry Melanson. He has the perogative of accepting these changes or not. N. B. There is no longer the possibility for developers themselves to ask for a bug fix for a production release.

3. At this time, the muon code release managers are Christophe Royon, Linda Stutte and Daria Zieminska. The L3 Muon contact person is Martijn Mulders.
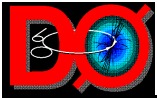
- Current p11 segment finding (or underlying package) still has giant memory leak hidden somewhere! Must be solved.

- Possible 'online' memory leak still under investigation → will do another test run with beam this week. → if outcome positive, L3 Muon very soon online for real!

- Converging on improved Muon Code Management. Important that all developers are aware of these new procedures!

  First success: new version of muon_raw which crashes L3 in first event is excluded from today's p11.06.00 build!